<u>WHAT IS CLAIMED IS</u>:

1. A method for integrating an engine nacelle under a wing for a supersonic aircraft comprising:

constraining the pressures under a reflexed airfoil portion of the wing to canceling only positive pressures, wherein the reflexed airfoil portion includes a convergent section thickness of the underside of the wing that begins at an intermediate location between the leading edge and the trailing edge of the wing, and extends to the trailing edge of the wing, and the shape of the convergent section thickness is formed with at least one reflex angle;

constraining the slope of the at least one reflex angle of the reflexed airfoil portion proximate the trailing edge of the wing to values greater than or equal to zero; and

determining the at least one slope of the reflex angle that meets the pressure and reflex angle slope constraints.

2. The method according to Claim 1 further comprising:

determining the pressure under the reflexed airfoil portion using finite pressure difference calculations; and

smoothing the shape of the reflexed airfoil portion along the local Mach angle lines.

3. The method according to Claim 1 further comprising:

determining the shape of the reflexed airfoil portion along the span of the wing with and without accounting for the nacelle boundary conditions.

4. The method according to Claim 1 further comprising:

modifying the shape of the nacelle to meet the pressure constraint.

5. The method according to Claim 1 further comprising:

redistributing the depth of the reflexed airfoil portion such that the reflex depth is at or below a desired wing thickness curve across at least a portion of the span of the wing.

6. The method according to Claim 1 further comprising:
initializing computational fluid dynamics iterations with an approximate reflexed airfoil portion.

7. The method according to Claim 3 further comprising:
adjusting the reflexed airfoil portion based on nacelle shock reflections.

8. The method according to Claim 1 further comprising:
shifting the start of the reflexed airfoil portion in front of the inlet of the nacelle to reduce spillage of subsonic airflow in the inlet.

9. An aircraft comprising:
a wing with a non-movable reflexed airfoil portion, wherein:
the reflexed airfoil portion includes a convergent section thickness of the underside of the wing that begins at an intermediate location between the leading edge and the trailing edge of the wing, and extends to the trailing edge of the wing,
the shape of the convergent section thickness is defined by at least one reflex angle, and
the slope of the at least one reflex angle is greater than or equal to zero proximate the trailing edge of the wing.

10. The aircraft according to Claim 9 wherein:
the wing includes an inboard gull dihedral portion .

11. The aircraft according to Claim 9 wherein:
a subsection of the reflexed airfoil portion is shifted in front of the inlet of the nacelle to prevent spillage of subsonic flow into the inlet.

12. The aircraft according to Claim 9 further comprising:
an engine nacelle with increased thickness between the reflexed airfoil portion and the nacelle, wherein the increased thickness of the nacelle is shaped to

maintain positive pressure under the reflexed airfoil portion to the trailing edge of the wing.

13. The aircraft according to Claim 9 wherein:
a diverter coupled between the nacelle and the wing, wherein the diverter is shaped to maintain positive pressure under the reflexed airfoil portion to the trailing edge of the wing..

14. An aircraft design system comprising:
logic instructions operable to:
determine the shape of a reflexed airfoil portion of a wing, wherein the reflexed airfoil portion is a convergent section thickness of the underside of the wing that begins at an intermediate location between the leading edge and the trailing edge of the wing, and extends to the trailing edge of the wing, and the shape of the convergent section thickness is formed with at least one reflex angle;
allow the user to constrain the pressures under the reflexed airfoil portion to canceling only positive pressures; and
allow the user to vary the thickness of a nacelle under the wing to meet the pressure constraint.

15. The system according to Claim 14 further comprising:
logic instructions operable to:
allow the user to constrain the slope of the at least one reflex angle of the reflexed airfoil portion proximate the trailing edge of the wing to values greater than or equal to zero; and
determine the at least one slope of the reflex angle that meets the pressure and reflex angle slope constraints.

16. The system according to Claim 14 further comprising:
logic instructions operable to:
determine the pressure under the reflexed airfoil portion using finite pressure difference calculations; and

smooth the shape of the reflexed airfoil portion along the local Mach angle lines.

17. The system according to Claim 14 further comprising:
logic instructions operable to:
determine the shape of the reflexed airfoil portion along the span of the wing with and without accounting for the nacelle boundary conditions.

18. The system according to Claim 14 further comprising:
logic instructions operable to:
redistribute the depth of the reflexed airfoil portion such that the reflex depth is at or below a desired wing thickness curve across at least a portion of the span of the wing.

19. The system according to Claim 14 further comprising:
logic instructions operable to:
initialize computational fluid dynamics iterations with an approximate reflexed airfoil portion.

20. The system according to Claim 17 further comprising:
logic instructions operable to:
adjust the reflexed airfoil portion based on nacelle shock reflections.

21. The system according to Claim 14 further comprising:
logic instructions operable to:
shift the start of the reflexed airfoil portion in front of the inlet of the nacelle to reduce spillage of subsonic airflow in the inlet.